

REPLACEMENT SHEET

CALIBRATOR FOR LIQUID FLOWMETER

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application is U.S. National Phase §371 application of International Application No. PCT/CA2005/000365 filed on March 18, 2005, which in turn claims priority from Canadian Patent Application Ser. No. 2,463,477, filed on April 13, 2004, both of which are incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The present invention comprises a liquid measurement device for use in, but not limited to, the measuring and calibrating of liquid flowmeters, mostly for petroleum liquids. In particular, the present invention comprises a temperature-compensated method and apparatus for calibrating petroleum fuel meters ("gas pumps"), such as at gas stations and the like.

BACKGROUND OF THE INVENTION

[0003] For petroleum products sold in the retail sector, the method currently used to calibrate meters is dangerous and outdated. In the Prior Art, for each meter, the technician performs the following steps:

1. Place the calibration tank on the ground;
2. Fill the calibration tank with the fuel nozzle of a gas pump;
3. Kneel and take the measurement of the level of the liquid;
4. Write the measurement down;
5. Empty the calibration tank making sure it is truly empty, for the next filling (the technician must not see any drops dripping down for a certain amount of time);
6. Adjust the calibration of the meter; and
7. Repeat steps 1 through 6 until the calibration is adequate.

[0004] During the whole process, spills, fumes and damage are inevitable and the technician is constantly exposed to fumes. Accidents are frequent.

[0005] The main inconvenience the need to wait until the last drops have fallen during the emptying of the tank.

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[0006] U.S. Patent No. 5,277,053 by Campbell describes a method by which calibration of current systems are done under actual conditions. It includes a first measure at a distance of a first spot, followed by a second measure from a second spot, knowing exactly the move from the first spot, that way the measures are done with a precise knowledge of the shift to get a constant calibration.

SUMMARY OF THE INVENTION

[0007] The present invention comprises a calibrator for liquid-flow meters, which is used to calibrate liquid-flow meters, mostly for petroleum liquids. The present invention makes the calibration operation safe, and it also protects the operator, the public, and the environment. It may also be used advantageously for the measurement of any liquid with the appropriate viscosity.

[0008] In the present invention, certain quantity of liquid goes through one tank, with other tanks being arranged in series, allowing accelerated calibration of retail petroleum products.

[0009] The calibrator is made of one or several graduated tanks containing 20 liters each, (or other measurement units depending on the country or requirements), mounted on a vehicle.

[0010] Reading the meter is easy, precise, and ergonomic.

[0011] Fumes from the calibration process are recycled.

[0012] In the present invention, each of the tanks has a sloped bottom (40 degrees or so), followed by a valve, a transparent dripping reference unit and a second valve attached to a common pipe (sloped) and ending with an ultimate valve. The piping is made of stainless steel.

[0013] The transparent drip reference unit is provided to allow the user to see that all fluid has been drained from the tank(s) prior to refilling.

[0014] This particular arrangement allows liquid circulation in a closed circuit, eliminating handling spills, loss of liquid, and escaping fumes

[0015] The invention allows the liquid to return without fumes or turbulence, making the calibration 100% safe. Therefore, the present invention helps eliminate fumes, spills, and splashes, during both the filling and the emptying of the tanks. The technician will not have to repeatedly pour the liquids from the test-tank to underground tank.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] Figure 1 is a side view of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0017] Referring to Figure 1, calibrator 1 is a machine used to calibrate petroleum liquid-flow meters. It can also be used for any liquid with adequate viscosity.

[0018] Calibrator 1 comprises of one or several stainless steel graduated tanks 2 mounted on a level-able vehicle 18. When filling, fumes are recycled by way of hose 3 coming from the top of the necks of tanks 2 and ending in ventilation pipe 16 equipped with removable exhaust valve 17 on top. Each of tanks 2 has a sloped bottom, at roughly a 40 degree angle, followed by valve 15, transparent drip reference unit 5 and another valve 14 leading to common pipe 19 and exit valve 13. The piping is made of stainless steel. When emptying the apparatus, the fumes are also recycled. The whole emptying process is done in a closed circuit without turbulence and without fumes.

[0019] The transparent dripping reference unit 5 makes calibration work safer by allowing the user to view the flow of fuel through the apparatus and know when the flow has stopped.

[0020] To calibrate with the invention, the technician takes the following steps:

1. Park the calibrator near the fuel pump.
2. Use the lever 6 to lift the wheels off the ground.
3. Ground the calibrator to the pump, with conductor with alligator clip 7.
4. Install a gasoline return hose (not shown) between final exit pipe 8 and the gas station's underground tank.
5. Open exit valve 13
6. Fill tanks 2, one at a time, by inserting the gas pump nozzle into neck 9 of one of tanks
2. Neck 9 traps the fumes, as the opening of neck 9 is lined with a rubber gasket which is in contact with the nozzle.
7. Adjust the two levels 10 to both axes with the two handles 11 to level the unit.
8. Take the readings while standing up using calibrated scale 4.
9. Note the readings by turning the round pre-marked recall set-up 12.
10. Open the valves 13, 14, and finally 15, to empty out the tanks.
11. Adjust the meters of the pump, if need be.
12. Close valve 14 as soon as the tanks are empty.

13. Make sure the tanks are truly empty before closing valve 15, by observing the last drops of liquid dripping down, through the transparent drip reference unit 5.
14. Proceed with new test as required.

[0021] While the preferred embodiment and various alternative embodiments of the invention have been disclosed and described in detail herein, it may be apparent to those skilled in the art that various changes in form and detail may be made therein without departing from the spirit and scope thereof.